

Vibro-Lab280

User Manual



Please be sure to read this entire user manual prior to use of the equipment.
Please read all safety instructions carefully.

This user manual is part of the product. Keep it in a safe place for future reference.
Replacement manuals can be downloaded from our webpage at:

www.sanimembranes.com

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1. Description

1.1. Introduction

The Vibro-Lab280 Drive together with the Lab280 cartridges is a portable benchtop filtration system for continuous microfiltration and ultrafiltration applications.

The Lab280 cartridge holds two sheets of membrane with in total 280 cm² of area in an open flow channel design. The patented Vibro® technology-unit moves the cartridge including the membrane element relative to the media. Thus, creating turbulence in the media on the membrane surface.

The turbulence created on the membrane surface ensures a fast and low fouling filtration process without the need of conventional tangential crossflow. The Vibro-Lab series is perfect for process development, small batch production and other applications where traditional dead-end filtration devices give up and tangential crossflow solutions are few and expensive.

Disruptive in size, simplicity and process, with no dead-legs, easy to clean, easy to service and simple to operate.

The Vibro-Lab is exceptional for gaining insight into the filtration process, for selecting the right membranes and for filtering almost any media with continuous membrane filtration in a laboratory or even small production scale.

1.2. Validity

This manual applies to the Lab280 in the following versions: Lab280 (000-0005) cartridge together with the Vibro-Lab280 Drive (001-0021)

This manual applies to the Lab280 in combination with the following components:

- Standard feed pump from SANI Membranes

The Vibro-Lab can filtrate the most demanding media with high viscosity, high solids loads and even high particulates with unprecedented results – less fouling, excellent flux, higher degree of up-concentration.

The vibrating membrane will keep fouling levels to a minimum and give you unimpeded fluxes and retentate concentrations.

The Vibro-Lab can also be operated as continuous filtration, with a feed pump feeding in media and continuously discharging of permeate and retentate. The vibrating membrane will diminish fouling and create a higher flux than conventional cross flow filtration.

The configuration with open flow channels allows for filtration with no need for pre-filtration even for high solids loading and high viscosity media.

The element has an integrated and open permeate channel design. Thus, the retentate as well as the permeate can be drained completely - no product loss.

The cartridge can be configured with virtually any commercially available MF or UF membrane.

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1.3. Symbols

As warning of danger, all text statements in these instructions to be noted will be marked as follows:



This symbol denotes a possible danger with medium risk that death or (severe) injury may result if it is not avoided.



This symbol denotes a possible danger with a low risk that moderate or minor injury may result if it is not avoided.

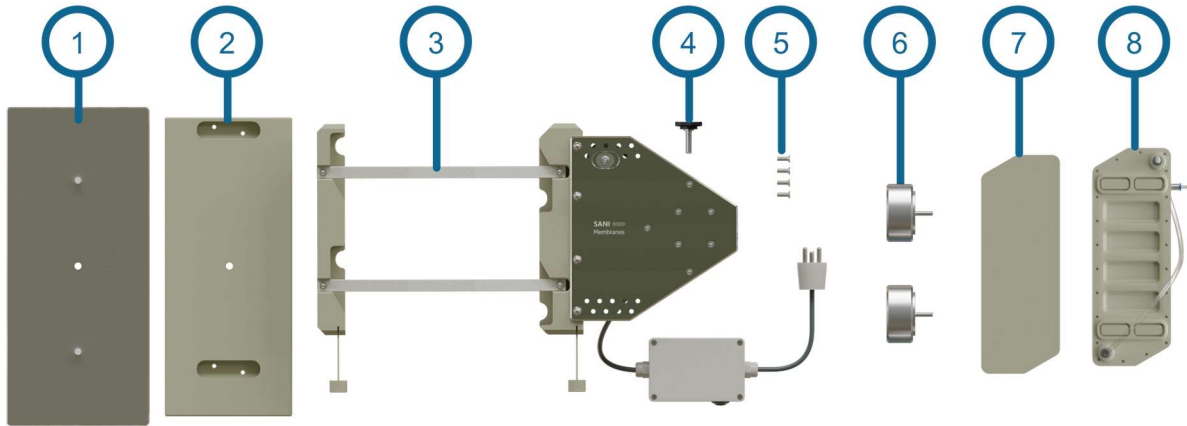
ATTENTION

This symbol denotes a danger with low risk of damage to property if not avoided.

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2. System



2.1. Parts list

1. Vibro-Base
2. Bottom Plate
3. Vibro-Lab280 Drive
4. Fingerscrew
5. 4 x M5 Screws
6. Counterweights
7. Lab280 Dummy Cartridge
8. Lab280 Cartridge

2.2. System description

The Lab280 Cartridge is fitted with membrane on both sides of the membrane chamber. It has a media inlet at the bottom of the cartridge facing the back, and an outlet at the top facing the front. Both are fitted with quickfit ports suitable for 6mm (OD) tubing.

The two sides are connected with a tube leading the medium from the first side to the second. When media is fed through the feed inlet, it is transferred to the bottom of the second membrane chamber through the connected tubing. When the second chamber is full, the media leaves the cartridge via the retentate outlet in the top of the second chamber.

The two membrane chambers have a single permeate outlet (suitable for 4 mm (OD) tubing). The permeate outlet is placed on the side of the cartridge pointing upwards to avoid air pockets inside.

When facing front, the drive is mounted with 4 bolts through the right adaptor side plate. The whole assembly is placed on two leaf springs. The Vibro-Lab280 Drive delivers the vibrating motion of the entire assembly and air cushions inside each membrane chamber make the media stationary inside the cartridge.

The Vibro-Lab280 assembly is placed on the Vibro-base in order to reduce vibrations from the unit.

SANI Membranes offers a feed pump for use with the Lab280, but it can be operated with any suitable feed system for use with the specific application.

See examples of use in the Operation section.

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3. Safety


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3.1. Intended use


The Vibro-Lab280 assembly is a manually operated benchtop filtration system for MF and UF filtration. The user should read and understand this manual before use. The Vibro-Lab280 is intended for use in a laboratory setting or in an industrial, research or teaching facility.

The Vibro-Lab280 is intended to filter media and can only be used with a membrane cartridge from SANI Membranes.

The Lab280 Cartridge is designed to operate at maximum 2 bar(g) at room temperature. The feed system could be the standard feed pump from SANI Membranes. Other feed systems can be used, but if capable of providing more than 2 bar(g), a CE approved safety valve of maximum 2 bar(g) must be used for protecting the Lab280 Cartridge.

The Vibro-Lab is NOT suited for use in explosive environments.  **WARNING**

This instruction manual is part of the Vibro-Lab280 and is intended exclusively for use in accordance with this instruction manual.

The Vibro-Lab280 must only be used for intended use, the following are examples of improper use  **WARNING:**

- Unauthorized modifications and technical changes to the Vibro-Lab280 are improper use.
- Operation outside the permissible physical conditions given in this document (e.g. temperature, pressure, chemical vapors etc.) and given in the specification sheet for the membrane cartridge used.
- Installation of unauthorized items on the Vibro-Lab280.
- Connection of unsuited devices to the Vibro-Lab280 (e.g. unsuited feed systems).
- Use of media with biological materials in Safety Classes 2 and 3.
- Use of flammable or potentially explosive substances.
- Filtration of unstable media.
- Use of media which are incompatible with the materials in the Lab280 Cartridge element or feed system used (check specification).

3.2. Personnel qualification


All personnel operating the Vibro-Lab280 must have read this instruction manual thoroughly and be skilled in the art of pressurized filtration. All personnel operating the Vibro-Lab280 should be used to conduct themselves in a laboratory environment and have passed mandatory safety courses etc. Students operating the Vibro-Lab280 must be instructed thoroughly by skilled teachers or other skilled personnel in proper use of the Vibro-Lab280.

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3.3. Media

The media used in the system can be dangerous to handle and cause personnel injuries or equipment damage when not handled correctly.

The operator should always seek the applicable safety information for the media to be filtered (e.g. handling and storage and conduct in emergency situations).  **WARNING**

Personal safety equipment should always be worn when applicable (e.g. safety goggles, safety gloves etc.).  **WARNING**

Do not use media with biological materials in Safety Classes 2 and 3.  **WARNING**

Do not use flammable or potentially explosive substances.  **WARNING**

Do not use unstable media where concentration changes might start chemical reactions within the media.  **WARNING**

The operator should always make sure that the media to be filtered is compatible with the materials in fluid connection in the Lab280 and the feed system used. **ATTENTION**


3.4. Pressurized components


If the pressure needed for the membrane assembly is generated by an external feed system (not included), then the membrane assembly, the external feed system and the tubing and fittings between the external feed system and the membrane assembly are one pressurized system. The system must be **operated at maximum 2 bar(g)** at room temperature and if the external feed system is capable of providing more than 2 bar(g) to the pressurized system it must have a CE approved safety valve set at **maximum 2 bar(g)**.

Parts of the system can burst if they are subjected to pressures over 2 bar(g).  **WARNING**


Operating Pressure: 0-2 bar(g) at 5-35 °C and 0-1 bar(g) at up to 55 °C

3.5. Leaking fluids

If the fluid system is leaking, liquid spill can cause a serious health danger depending on the media. The operator should always seek the applicable safety information for the media (e.g. handling and storage and conduct in emergency situations). Personal safety equipment should always be worn when applicable (e.g. safety goggles, safety gloves etc.).  **WARNING**

If the fluid system is leaking, liquid spill to the floor can cause a slipping hazard.  **CAUTION**


3.6. Sharp objects


The leaf springs are sharp objects. Be careful not to get in contact with the leaf springs when assembling or disassembling the system.  **CAUTION**


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3.7. Moving parts





Body parts can be crushed when they come into contact with moving parts, e.g. the membrane assembly. This can lead to injuries.  **WARNING**

Loose hair or loose clothing parts can be caught in moving parts and cause injuries.  **CAUTION**

The Vibro-Lab280 must be placed on a horizontal non-slippery surface as the vibrating movement can otherwise make the Vibro-Lab280 move during operation and can cause injuries if it falls to the floor.  **CAUTION**

3.8. Personal protective equipment



Mandatory personal protective equipment to protect against risks arising from the equipment or the material being processed:

- Tight-fitting work clothing - Protects against being caught by moving parts.  **CAUTION**
- Head covering - Protects hair from being pulled into moving parts.  **CAUTION**
- Safety glasses - Protects against substances leaking under high pressure, splashing liquids etc.  **WARNING**
- Safety shoes - Protects against injuries to the feet caused by mechanical effects.  **CAUTION**

3.9. Accessories and spare parts

The Vibro-Lab280 can only be used together with a feed system that provides a maximum pressure of 2 bar(g). If the system is capable of providing more than 2 bar(g) a CE approved safety valve set to maximum 2 bar(g) must be used. The feed system could be the Standard feed pump from SANI Membranes.

The use of unsuitable accessories, consumables and spare parts can be hazardous and have the following consequences:

- Severe personnel injury  **WARNING**
- Damage to the device  **WARNING**
- Malfunctions of the device **ATTENTION**
- Device failure **ATTENTION**

Only use accessories, consumables and spare parts that are in technically perfect condition.

The use of accessories, consumables and spare parts **not** approved by SANI Membranes is the sole responsibility of the operator.

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4. Assembly

4.1. Tools Needed

Tools needed for assembly:

Tool	Size
Hex-Key	5 mm
Hex-Key	3 mm

Tools needed for maintenance:

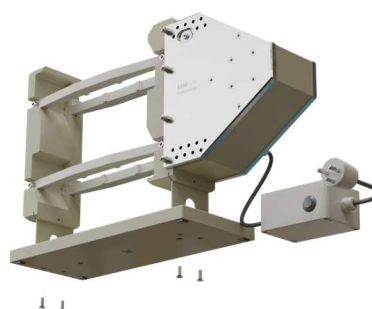
Tool	Size
2 x Spanner	10 mm

4.2. Assembly of the Vibro-Lab280

1. Place the leaf springs into the grooves of the baseplate.



2. Secure the adaptor to the baseplate using 4 x M5 Screws.



3. Place the steel base plate onto a flat surface.

4. Place the Vibro-Lab280 onto the steel base plate and tighten the fingerscrew in the centre.



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4.3. Mounting of membrane cartridge

1. Unscrew the four bolts securing the front pressure-bars
(Tool: 5 mm Hex-Key)



2. Slide two Lab280 Cartridges into the adaptor, or alternatively one Lab280 Cartridge and a dummy.

Make sure the permeate outlet is facing up and is connected to a tube. ATTENTION

Never run the Vibro-Lab280 with an empty slot. ATTENTION



3. Slide the pressure bars in from the left.

Make sure the tubing goes around the pressure bars and not between the bars and the Lab280 Cartridge. ATTENTION



4. Secure the pressure bars with 4 x M6 x 60 bolts.
(Tool: 5 mm Hex Key)

Slowly tighten the bolts, switching bolt between each turn to ensure an even tightening. ATTENTION

5. Screw the counterweights in place until a slight resistance occurs.

The counterweights holds the cartridge in place, and should only be tightened slightly. Unscrew prior to changing cartridge.




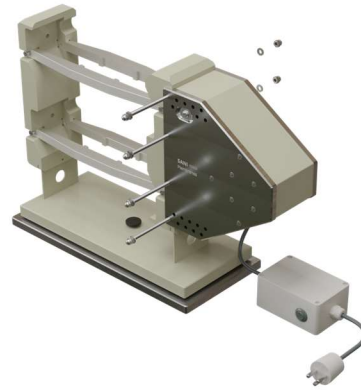
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4.4. Removal of Drive

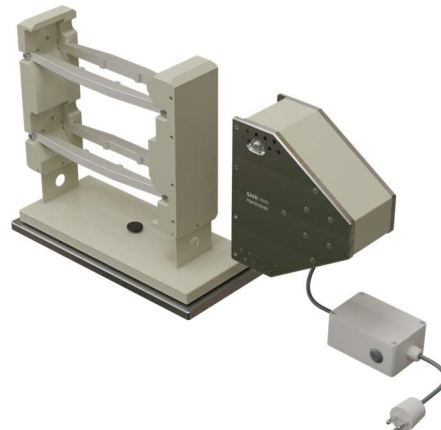
1. Unplug the Vibro-Lab280 Drive
2. Loosen and remove the 4 x M6 Cap nuts and M6 Washers.
3. Remove the 4 x 121mm rods, attached to 4 x M6 Cap nuts and M6 Washers using a 10 mm Torque Wrench

Make sure the Vibro-Lab280 is NOT connected to an outlet.  **WARNING**



4. Carefully remove the drive

Make sure the Vibro-Lab280 is NOT connected to an outlet.  **WARNING**




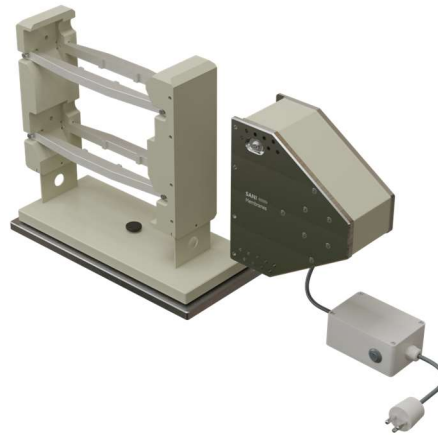
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4.5. Installation of Drive

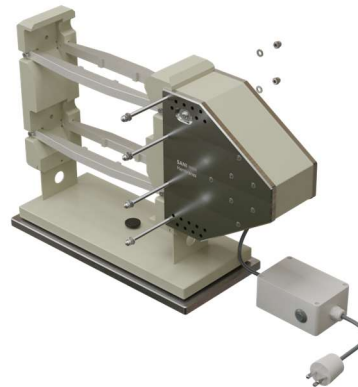
1. Slide the Drive onto the Lab280-Adapter side plate, aligning the holes

Make sure the Vibro-Lab280 is NOT connected to an outlet.  **WARNING**



2. Secure the Vibro-Lab in place using 4x 121mm rods, secured with 8 x M6 Cap nuts and M6 Washers.

3. Tighten with approx. 4 Nm using a 10 mm Torque Wrench

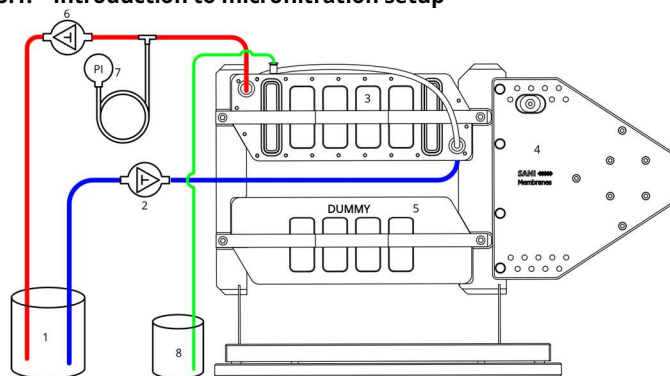


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5. Operation

5.1. Introduction to microfiltration setup



1. Feed/Retentate Vial
2. Peristaltic Feed Pump
3. Lab280 Cartridge
4. Vibro-Lab280 Drive
5. Lab280 Dummy
6. Peristaltic Retentate Pump
7. Manometer
8. Permeate Vial

Many new membranes are supplied with a water-soluble glycerin layer for protection. Before introducing product, this should always be conditioned by washing thoroughly with clean hot water. A 20 min warm water wash where both retentate and permeate is discarded continuously is recommended before use.

Always use the best quality water you have access to. Water is many things and parts like carbonates, phosphates, particles etc. present in normal tap water can harm the effectiveness of the membrane and the CIP cleaning.

Introduction of feed solution:

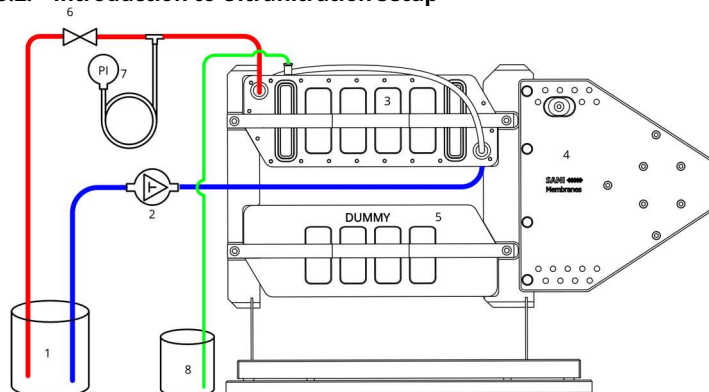
1. Start with a fully assembled Vibro-Lab280 unit as shown above.
The use of two pumps is recommended for microfiltration applications.
Tip: To avoid dilution of the feed solution the system can be drained from water just before introducing the product media.
2. Fill the Feed/Retentate Vial (1) with your feed solution.
3. Start the Peristaltic Feed Pump (2) and the Peristaltic Retentate Pump (6) at the same speed.
Tip: The recommended retentate flow rate is 8-16 L/h per Lab280 Cartridge which corresponds to around 160-180 RPM on the standard SANI Membranes laboratory pump.
4. Turn on the Vibro-Lab280 Drive (4) as soon as both sides of the Lab280 Cartridge is filled with feed solution.
5. Adjust the speed of the Peristaltic Feed Pump (2) until the desired permeate flow rate is reached. The pressure may initially be too low to observe.
6. Re-adjust the speed of the Peristaltic Feed Pump (2) throughout the experiment to run at the desired permeate flow rate.
7. Collect the permeate in a separate Permeate Vial (8) to study the process during concentration mode.
To study the process, especially product transmission and transmembrane pressure at varying permeate flow rates the permeate can be returned to the Feed/Retentate Vial (1) to keep the feed solution composition constant.
8. When the experiment is finished:
Adjust the Peristaltic Pumps to have the same flow rate / no permeate flow rate and then stop both pumps. For draining of the concentrated liquid inside the module: Lift the retentate tubing above the liquid level in the Feed/Retentate Vial and start both pumps running in reverse.
After collecting the product the system should be filled with liquid to prevent the membranes from drying out.

Clean the system with an appropriate CIP protocol for your membrane and application (Remember to CIP the manometer tubing as well). Make sure to run the Peristaltic Feed Pump at slightly higher RPM than the Peristaltic Retentate Pump to clean the permeate side too. Finish the CIP by a clean water rinse. For storage until next use see separate section on storage of membranes.

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5.2. Introduction to Ultrafiltration setup



1. Feed/Retentate Vial
2. Peristaltic Feed Pump
3. Lab280 Cartridge
4. Vibro-Lab280 Drive
5. Lab280 Dummy
6. Retentate valve
7. Manometer
8. Permeate Vial

Many new membranes are supplied with a water-soluble glycerin layer for protection. Before introducing product, this should always be conditioned by washing thoroughly with clean hot water. A 20 min warm water wash where both retentate and permeate is discarded continuously is recommended before use.

Always use the best quality water you have access to. Water is many things and parts like carbonates, phosphates, particles etc. present in normal tap water can harm the effectiveness of the membrane and the CIP cleaning.

Introduction of feed solution:

1. Start with a fully assembled Vibro-Lab280 unit as shown above.
Tip: To avoid dilution of the feed solution the system can be drained just before introducing the product media.
2. Fill the Feed/Retentate Vial (1) with your feed solution.
3. Start the Peristaltic Feed Pump (2).
Tip: The recommended retentate flow rate is 8-16 L/h per Lab280 Cartridge which corresponds to around 160-180 RPM on the standard SANI Membranes laboratory pump.
4. Start the Vibro-Lab280 Drive (4) as soon as the Lab280 Cartridge is filled with feed solution.
5. Adjust the Retentate valve (6) until the desired retentate pressure (7) is reached.
When increasing this pressure the retentate flow rate may drop due to the additional resistance for the Peristaltic Feed Pump (2).
Check the retentate flow and adjust the Peristaltic Feed Pump if needed to keep a retentate flow rate of 8-16 L/h.
6. When the feed solution becomes more concentrated the resistance in the Retentate valve will change and the pressure may change as a result:
Check the pressure regularly and make any necessary adjustments using the Retentate Valve.
Check the retentate flow and adjust the Peristaltic Feed Pump if needed to keep a retentate flow rate of 8-16 L/h.
7. To find the optimum operating pressure study the permeate flow rate as a result of increasing retentate pressures. This is best studied at steady-state conditions by returning the permeate to the Feed/Retentate Vial.
To find the relationship between flux and concentration study the permeate flow rate as a result of increasing product concentration. This is best done at constant retentate pressure, and by collecting the permeate in a separate vial.
8. When the experiment is finished:
Stop the Peristaltic Feed Pump and open the Retentate Valve.
For recovery of the concentrated liquid inside the module: Lift the retentate tubing above the liquid level in the Feed/Retentate Vial and run the Peristaltic Feed Pump in reverse until bubbles appear.
After collecting the product in the feed/retentate vial the system should be filled with liquid to prevent the membranes from drying out.

Clean the system with an appropriate CIP protocol for your membrane and application (Remember to CIP the manometer tubing as well). Make sure to adjust the Retentate valve to generate a positive pressure to drive the liquid through the permeate side of the membrane unit. Finish the CIP by a clean water rinse. For storage until next use see separate section about storage of membranes.

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5.3. General guidelines – process

1. Maintain a positive trans membrane pressure (min 0.02 bar) when vibration is on.
2. Maintain a retentate flow to avoid dead-end type filtration. The required retentate flow is highly application dependent but a flow rate of 8 – 16 L/h is recommended. For highly viscous feed solutions or feed solutions containing highly concentrated solid matter higher retentate flow rates may be applicable.
3. The Operating Pressure should be in accordance with the Cartridge specifications.
4. For microfiltration a very low trans membrane pressure often gives the best long-term results.

Microfiltration (0 – 1 bar)

1. Focus on controlling the permeate flow rate rather than controlling the pressure. Often, a very low pressure (below 0.1 bar) is optimal especially in case of transmission sensitive microfiltration processes.
2. Applying too high permeate flow rates can easily result in severely fouled areas in the Lab280 Cartridge. Limit the permeate flow rate by using the two-pump setup and study the process at increasing permeate flow rates for selecting optimal operating conditions.

Ultrafiltration (1 – 2 bar)

1. A pressure of 1.5 to 2 bar often gives the best long-time results.
Make sure that the system pressure does not exceed the rated pressure – a safety valve may be required.

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5.4. CIP operation

The following procedure is a general guideline for the cleaning of the Vibro-Lab280. The individual process and product may require an optimization of the cleaning procedures to achieve satisfactory cleaning results. Please consult a qualified chemicals supplier for application specific cleaning regimes.

Important:

The actual selection of CIP chemicals, their concentration and the temperature used should be in accordance with the chemical compatibility of the individual membrane.

Water flushes, buffer flushes or CIP cleaning must be performed after each run with media in the Vibro-Lab280.

For each cleaning step ensure that liquid flows through the permeate line. This is done by adjusting the retentate valve (UF setup) or increasing the speed difference between the two pumps (MF setup)

Remember to clean dead ends too, such as the line to the manometer. This can be disconnected and flushed separately for cleaning.

A typical CIP routine for operation with organic material could consist of:

1. A 55 °C hot water flush to remove loosely attached material and warm up the system before CIP.
2. A 30 min 55 °C caustic wash at pH 11-12 with an appropriate CIP chemical (observe membrane compatibility).
3. A water flush to replace the caustic liquid.
4. A 15-20 min 55 °C acid wash at pH 2 with an appropriate CIP chemical (observe membrane compatibility).
5. A thorough water flush.

After cleaning the membrane, the clean water flux should be measured. By comparing the clean water flux after each cleaning cycle with the original membrane performance it is possible to determine if the cleaning regime is sufficient to ensure a good recovery of the membrane. As the clean water flux is temperature and pressure dependent the measurement should be done at the same reference conditions for direct comparison.

Although it is membrane and application dependent, a recovery of 80% or more of the initial water flux should be expected from a suitable cleaning regime.

5.5. Storage of membranes

The membrane should never be allowed to dry out. When idle the Lab280 Cartridge should be filled with water or a suitable aqueous solution. For short term storage (hours) it can be left in water. For longer periods it is recommended to add a suitable solution to keep the membranes wet, and to prevent bacterial growth during storage.

The storage solution should be selected in accordance with the chemical compatibility of the specific membrane material. Some examples of storage solutions are:

- 0.1 N NaOH
- 20% ethanol
- 20% isopropanol

For long term storage it is recommended to replace the storage solution at regular intervals, for instance every 3-6 months.

When preparing the Lab280 Cartridge for storage it is important to evacuate the permeate compartment from air. This is best done by recirculating the storage solution in the process setup applying a suitable permeate flow until air does not appear in the permeate outlet. Once the membrane module is evacuated from air the three Cartridge ports should be closed by plugs.

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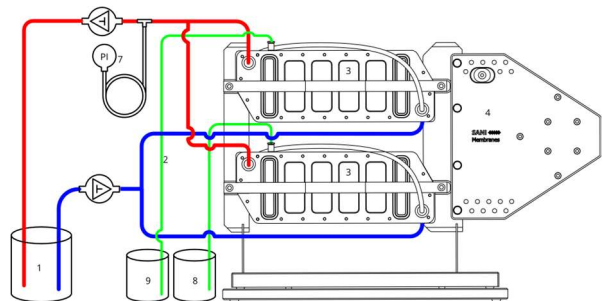
6. Examples of process configurations

The system can be configured and operated in a number of different configurations, depending on the type of product, membrane and process objective. The most commonly used are the batch configurations described in the previous sections. The system is prepared for two Cartridges, and this can be used for running two Lab280 Cartridges simultaneously. This can be used for comparison of two different membranes on the same feed solution, or simply to have a larger membrane area available for testing on a larger sample volume.

In the following a few other configurations are listed along with a brief description of the main purpose of each one.

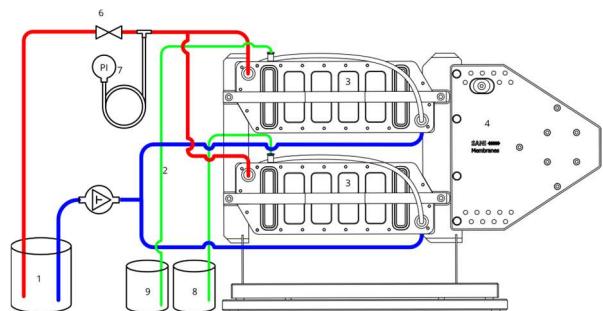
6.1. Parallel study of Microfiltration process on two different membranes

- Two different Lab280 Cartridges can be run with the same feed solution to directly compare the performance at the same conditions.
- By following the microfiltration guideline above and measure the individual permeate flow rates from the two cartridges the performance can be directly compared.
- By sampling the permeate from each cartridge and comparing target protein content the setup can be used for studying the differences in protein transmission on different membranes.



6.2. Parallel study of Ultrafiltration process on two different membranes

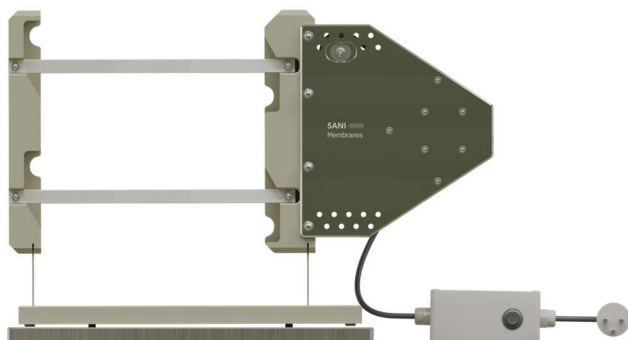
- Two different Lab280 Cartridges can be run with the same feed solution to directly compare the performance at the same conditions.
- By following the ultrafiltration guideline above and measure the individual permeate flow rates from the two cartridges the performance can be directly compared.
- For concentration of target product simultaneous sampling from the feed solution and the permeate lines can directly compare the selectivity / % retention of the target product.
- Similarly, for studying a fractionation process, the setup and sampling can be used for comparing two membranes directly in terms of how sharp a separation of two different molecules can be achieved



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7. Technical Data



Vibro-Lab280 Data	
Weight	12.7 kg + damper steel base 8.4 kg
Dimensions (L x W x H)	532 mm x 180 mm x 390 mm
Vibro-Lab280 Drive	Electric
Power Consumption	230V, 40W excl. feed system
Noise Level	50-65 dBA

Vibro-Lab280 Accessories and Spare Parts	
Standard Feed Pump	Peristaltic feed pump including pump tubing
Standard Retentate pump	Peristaltic retentate pump including pump tubing



Lab280 Cartridge Specification	
Membrane Area	280 cm ²
Dimensions	100 mm x 277 mm x 43 mm (without tubing & fittings)
Media Contact Materials	Polypropylene, Silicon, EPDM, Stainless Steel, Polyurethane & Membrane*
Fittings	Feed / Retentate 6mm (OD) Tubing, Permeate 4mm (OD) Tubing

Lab280 Use	
Media Temperature Range	5 – 55 °C
Operating Pressure	0 – 2 bar(g)
pH Range	1 – 13*
Viscosity Range, apparent	1 – 1000 cP

*Dependent on membrane

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8. Conformity

SANI Membranes are committed to develop and supply products that meet relevant regulatory standards and requirements set by governing bodies. For additional compliance or safety information, please contact SANI Membranes customer support.

The Vibro-Lab280 system is designed with sanitary execution in mind. All components, independent of the respective material, that are in direct contact with process media, have been selected to comply with relevant regulatory guidelines regarding food approvals. For further material compliance information please contact SANI Membranes customer support.

Electrical and electronic equipment (EEE) contains materials, components and substances that may be hazardous and present a risk to human health and the environment when waste EEE is not handled correctly. Components marked with the crossed-out wheeled bin are EEE and we recommend exercising caution when disposing of it and emphasize the importance of proper sorting. Please adhere to national regulations and consider reaching out to local recycling facilities for guidance and information.



8.1 EU version

The Vibro-Lab280 system is CE marked to demonstrate compliance with pertinent regulations, including the European Machine, Electrical and Pressure Directives. Hereunder we declare our sole responsibility that, the models mentioned in this manual are, when used as specified, in conformity with the technical requirements of the standards and the provisions of the essential requirements of the EU and other Directives detailed below:

- 2006/42/EU – *Safety of machinery.*
- 2014/35/EU – *Low voltage equipment.*
- 2014/68/EU – *Pressure Equipment.*



8.2 US version

Vibro-Lab3500 Drive incorporates electronic components that comply with UR approval to ensure that these components have all undergone rigorous testing, meeting industry safety and performance standards.